Student Services Spending and Competition between Colleges

Research Thesis

Presented in partial fulfillment of the requirements for graduation *with research distinction* in Economics in the undergraduate colleges of The Ohio State University

by

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I. Introduction

In recent years the increasing financial burden of attending college often leaves students and parents wondering where money and resources are allocated, and if higher tuitions truly mean higher educational quality. My research does not focus on why college costs continue to increase, but rather how colleges spend the money they take in. The recent advent of college rankings by media organizations such as U.S. News seemingly creates more competitive pressure between colleges, as they attempt to attract top students and strive for higher ranking and stronger reputations. While colleges may advertise strong academics, good instructors, or undergraduate research opportunities, they also must attract students with facilities and non-academic activities. One method for attracting students is through spending on student services. Student services are broadly defined by the Integrated Postsecondary Education Data System (IPEDS) as "activities whose primary purpose is to contribute to students' emotional and physical well-being and to their intellectual, cultural, and social development outside the context of the formal instructional program." Some examples include student activities, cultural events, student newspapers, intramural athletics and student organizations. When competing for strong students, colleges tend to advertise these things to prospective students.

This paper attempts to predict how colleges allocate expenses toward student services, and identify how geographic and institutional characteristics affect the way colleges compete via student services. The IPDEDS data center contains population-level information on over 7,000 higher education institutions in the US. This research only focuses on the colleges identified as "more selective" by the Carnegie Classification of Higher Education Institutions. This narrows the focus on colleges to about 400 institutions. Data mostly pertaining to institutional and geographical characteristics is collected and used for regression. Variables such as region,

college rank, total spending, enrollment, and college type are used in an OLS regression to predict student services spending behavior at universities.

Literature on the subject of college competition and finances tends to explore a few main areas. The first area of literature surrounds what drives cost increases at colleges. A researcher states, "simply put, cost increases at selective private colleges and universities are driven by the desires of these institutions to be the very best that they can be. Competitive pressures have caused their focus on pushing back the frontiers of knowledge and providing high-quality education to widen to include providing the very best student living, dining, and athletics facilities [Ehrenberg, 2000.]" In 2005, tuition at private non-profit colleges was 2.49 times higher than in 1980. During this time period, average endowment also grew 7.34 times [Peña, 2010]. In his paper, Peña attempts to find a link between increasing college wealth and increasing tuition among private colleges. He eventually concludes, "Accounting for input price increases or demand shifts is not enough to explain expenditures and tuition increases." While the goal is not to find a causal link between student services expenditures and tuition, this research explores a more specific expenditure category than the Pena paper. When Ehrenberg talks about colleges wanting to provide the very best student living, dining and athletic facilities, he is talking about student services expenditures. This research seeks to further explore these expenditures and understand how colleges behave when they must compete to provide the most high quality educational experience.

The second area is concerned with the market power of colleges based on college quality. Higher quality colleges have significantly more market power because they do not face as much competition from other lower quality colleges. Therefore, these colleges can set tuition above marginal cost and generate additional revenues to enhance college quality [Epple, 2006]. The

Epple paper points out that instructional and financial aid expenditures are strong indicators of overall college quality. While my final results do not explore instructional and financial aid expenditures, it will more closely explore spending on student services. The main focus of this research surrounds how colleges compete in the area of quality and overall experience rather than price.

Another bit of literature that deserves attention focuses on how geographic factors play a role in tuition and student service quality. Over the past several decades, the market for college education has integrated geographically. Between 1949 and 1994 the percent of students who attended private college in state decreased by about 25%. This geographic integration has pro-competitive effects, effectively reducing tuition-to-quality margins, and benefitting students [Hoxby, 1998]. Competition between colleges has increased due to this geographical integration, causing institutions to find new ways to increase their overall quality. This paper expands on this idea by accounting for the way in which geographic factors play a role in how institutions spend on student services.

The field of education research explores how college rankings became a lasting part of the 21st century academic landscape due to globalization and increased competition between colleges. College rankings provide an easy but flawed way of benchmarking and comparing institutions. College rankings can be thought of as a zero-sum game where there can only be a top 50 universities by definition. If one college goes up in a ranking another must go down, even if both colleges improved in educational quality [Altbach, 2010]. Although rankings like those done by U.S. News are widely criticized, colleges continue to publicize these highly influential ranks. These rankings likely place a great deal of competitive pressure on colleges seeking to improve ranking or attract top students. This paper explores how geographical proximity to a

"top 50" college might affect the competitive pressure a college faces, and how student services spending responds to these competitive pressures.

The general process for research first involved downloading university-level spending and institutional characteristics data from the IPEDS data center then narrowing the sample of colleges to "more selective" using the Carnegie Classification System. College ranking data are collected from the U.S. News and World Report as well as *The Gourman Report; Ratings of American Colleges.* These sources help to create a "top 50 college" variable used later on in regression analysis. The U.S. Census provides regional and city size data used to create variables for regression analysis. The use of OLS regression identifies variables and geographic factors that influence the student services spending behavior of selected colleges. The regressions indicate that top 50 colleges geographically influence the student services spending behavior of other colleges. As the distance from the nearest top 50 college decreases, a college tends to spend more on student services in order to compete. Furthermore, top 50 colleges are more sensitive to distance effects of other top 50 colleges, suggesting the possibility of higher competition between top 50 colleges. The regression also shows that in recent years, student services spending is more sensitive to geographical proximity to a top 50 university, potentially due to increased focus on college rankings and competition between colleges. Colleges located in the West and Northeast tend to spend significantly more on student services than colleges in the Midwest or South. This could potentially be related to the income distributions of each region.

II. Data

The primary data used in this project comes from the National Center for Education Statistics, as part of the Integrated Postsecondary Education Data System (IPEDS). The IPEDS data houses statistics on all postsecondary institutions in the United States, from years 1984-

2016. Each year of data contains tables with information pertaining to institutional characteristics; enrollment; completions; graduation rates and outcomes; admissions; student financial aid; human resources; finance; and academic libraries. The IPEDS data provides university spending variables including student services spending and total spending of each university. IPEDS also provides data on college characteristics such as enrollment and if the college is public, private or liberal arts. Geographic data such as state, CBSA, and longitude/latitude of each school also comes from IPEDS.

The Carnegie Classification System of Institutions of Higher Education provides data on selectivity levels of each college in the United States. This data helps narrow the sample of colleges to "more selective" for later analysis. The U.S. News and World Report Ranking of National Universities in 2015 ranks colleges within the US. This data source helps to identify schools as "top 50" used later on for analysis. Furthermore The Gourman report; ratings of American colleges (1967), is also used to identify "top 50" schools. The United States Census Bureau provides detailed geographic data that aids in assigning regions to each college as well as identifying if a college's CBSA is located in a "big city."

The initial work with data begins with pulling data tables for *all* universities in the US from the years 1985 to 2015. Specifically, the data is analyzed on five year intervals from 1985 to 2015 creating a panel with a maximum of seven years for each school. As of 2015 IPEDS housed data on over 7,000 higher education institutions. The IPEDS database is rich with statistics on virtually every college, and a major part of the process involves locating and extracting data relevant to the research subject. The data relevant to this project comes mainly from the institutional characteristics, enrollment, and finance data tables. IPEDS provides an option to import all data tables in .csv format. Files pertaining to finances, institutional

characteristics, and enrollment for years 1984 to 2015 were initially imported. After importing the .csv files into Excel, all relevant tables were imported into R for further analysis.

Institutional characteristics tables contain locational information on each college such as CBSA, state, and latitude/longitude. Furthermore these tables contain information on whether each university is public or private. Finances tables contain university spending statistics such as student services, research, instructional, and total spending. Enrollment tables contain statistics on the number of full time enrolled students at each university, including more detailed statistics on enrollment by race and gender. Most of work in R involved creating new data frames and variables by combining pertinent variables from numerous data tables. All data tables provided by IPEDS include the UNITID variable, which is a unique ID number for every college. This IPEDS UNITID variable is used to merge data frames. For example data on full time enrolled students for each college comes from the enrollment data tables. This data could be merged with data from the institutional characteristics data tables by matching UNITID between tables. This method produces the base of a data frame where relevant data from all IPEDS tables are consolidated and eventually used for regression analysis.

Once all relevant IPEDS variables were collected in one table, further filtering and addition of variables takes place. Within this table variables like spending per full time enrolled student, and logged spending variables are created. The logged and “per student” variables work better in the regression, and are easier to interpret in context. Per student variables are useful because they control for differences in student services spending between colleges due to size. For example, a college with 40,000 undergraduates will spend significantly more on student services than a college with only 4,000 undergraduates. Logged variables are useful for interpretation of spending changes in percentage terms. A “mean full time enrolled” variable

(mFTE) is also created from the IPEDS data. This variable is the average full time enrollment for each college over the 1985-2015 sample used in the regression. The year variable is also centered at the year 2000, to make interpretation within the regression easier. For example, the year 2000 is assigned a value of zero and the year 2015 is assigned a value of fifteen.

IPEDS provides data on virtually every for-profit and non-profit postsecondary institution in the US (over 7,000 records in IPEDS), therefore universities used for this research were narrowed in order to provide more meaningful results. The Carnegie Classification System of Universities categorizes universities by selectivity, among many other things. The Classification System allows for creation of custom listings where colleges can be classified in different ways. Under the "undergraduate profile" classification type, we restrict our analysis to colleges that are "four-year, full-time, more selective, lower transfer-in", and "four-year, full-time, more selective, higher transfer-in" are selected. For the purposes of this research these colleges will strictly be referred to as "more selective" for simplicity. This narrows the scope of universities used for analysis from over 7000 to a little over 400, helping to reduce issues that arise from incomplete and "messy" data that many smaller niche schools may provide.

Data on university ranks incorporated in the analysis were pulled from US News and World Report rankings of national universities in 2015 as well the 1967 book: *The Gourman report; ratings of American colleges*. College rankings from before 1985 were acquired in order to analyze the colleges that have had a strong reputation for over fifty years. The top 50 ranked colleges from each source were hand-matched by name with their corresponding UNITID in excel. The excel files were then exported to R and merged by UNITID with the base IPEDS table.

One of the most important variables for the regressions is each college's distance from nearest top 50 university. These distances were calculated using the longitudinal/latitudinal data provided in the institutional characteristics data tables from IPEDS. Top 50 ranked schools from U.S. News were used to calculate distances. In Excel, the 'haversine' formula is used to calculate the distance between every university and each "top 50 university." The minimum distance to the closest top 50 university is then used as the distance to nearest top 50 university.

Detailed geographical data that IPEDS does not provide comes from the US Census Bureau. Data on CBSA size – essentially city size – was pulled from the US Census Bureau in order to analyze the relationship between city populations and student services spending. There are 917 CBSAs in the US and for this research, a CBSA is defined as "big" if it is top 50 by population. These CBSAs were then matched with CBSAs of each school from the IPEDS base data set to create dummy variables for whether or not each school is in a "big city." The Census Bureau also defines four regions in the US: Northeast, Midwest, South, and West. These regional designations were used to assign regions to each school based on their state in the IPEDS base data set. "More selective" colleges that are located outside the continental US such as University of Puerto Rico were excluded from the final data set used for regression.

After removing the few colleges from the data set that did not report student services spending or total spending, 416 unique colleges remain for analysis. Tables 1 and 2 provide summary statistics for colleges included in the final dataset, overall and broken down by "top 50 schools" and "non-top 50 schools" as well. Student services spending, the regressand used for analysis, varies widely between schools in the dataset. The mean student services spending is just above $15 million for each school, however the standard deviation is almost $24 million. This is relatively unsurprising considering the diversity of college types in the sample. Top 50 colleges

also spend significantly more on student services per student compared to non-top 50 schools, spending on average 1.7 times more. Furthermore, Top 50 colleges spend 5.6 times more per student in terms of total spending. On average, colleges in the dataset are about 126 miles from the nearest top 50 college; only a couple hours by car. Yet the standard deviation for this variable is relatively large meaning some colleges are still very geographically isolated from top 50 schools. Colleges in this dataset are relatively evenly dispersed in each region, with a slightly higher proportion located in the Northeast. About 46% of colleges are located in a one of the fifty largest CBSA's, identified as a "big city". About 70% of the colleges are private, leaving about 30% as public. Note that the U.S. News rankings exclude liberal arts colleges from "national university" rankings used in this research. These general observations of the trends and characteristics of the data are analyzed further through regression analysis.

III. Results

The main focus and motivation of this paper surrounds increases in student services spending as more selective colleges attempt to compete with one another for top students. Colleges likely compete geographically, where colleges located close to other schools – especially good schools – spend more on student services than colleges that are more isolated. In Table 4, Regression 1.1 reflects this hypothesis, where the value on *Miles from nearest top 50 college* (*Miles* for short) is negative, and the regressand is *Log(Student Services Spending)*. As distance from the nearest top 50 college increases, student services spending decreases. Essentially schools that are more geographically isolated from top 50 schools tend to spend less on student services. These schools face less risk of losing students to top 50 universities, therefore they may spend less on student services, as the pressure of competition is lower.

Schools located close to other top 50 colleges likely face more competition, and therefore may spend more on student services due to higher pressure of competition.

An interesting result arises with the *Miles* variable when interacted with *Year* in the regression. As seen in regressions 1.4 and 1.5 the coefficient on the interaction is negative, meaning the effect of close proximity to a top fifty school becomes more important over time. Essentially, a nearby top 50 school has a greater effect on student services spending of a school in 2015 compared to 1985. For example, in 2015 as a school becomes further from a top 50 school, student services spending decreases more than it would have in 1985. Conversely, in 2015 as a school becomes closer to a top 50 school, student services spending increases more than it would have in 1985. The negative coefficient could be due to increased awareness and importance placed on college rankings over recent years. While recognizing the limitations of college rankings, the top fifty national university rankings provided by U.S. News still offer a solid guideline, and schools still tend to advertise their favorable rankings. This explains why some colleges may find themselves continuing to compete harder with well-ranked schools, as the influence of university rankings continues to rise.

Regression 1.4 also includes an interaction between being a top 50 school (*Top 50* for short) and *Miles*. The coefficient on this interaction is negative, similarly to the *Miles* variable. This means that top 50 schools are more affected by proximity to other top schools compared to non-top 50 schools. For example as a top 50 school becomes further from another top 50 school, student services spending decreases more compared to a non-top 50 school that moves further from a top 50 school. Alternatively, as a top 50 school becomes closer to another top 50 school, student services spending increases more compared to non-top 50 school that moves closer to a top 50 school. This indicates top 50 schools appear to have a relatively high sensitivity to the

proximity of another top 50 school. This could mean top 50 schools compete more, especially with other top 50 universities. While top 50 colleges may not need to worry as much about the competitive pressures of lower ranked schools, they likely still face fierce competition from other similarly ranked schools.

In regressions 1.1,2,4 and 5 a qualitative region variable places each college into a region; Northeast, Midwest, South, or West. These regions could be thought of as rough proxies for regional income. For example the Northeast and West are generally areas of high income and this is especially apparent along the coast in both the West and Northeast. The Midwest does contain areas of high income, but it may also be diluted by large rural areas of generally lower income. The South likely has lower average incomes of the four regions. People who live in areas of higher income have higher standards of living and may expect to go to a college that provides quality facilities, nice dorms, and solid student activities. It seems likely that student services would be a normal good, where areas of higher income would have colleges that provide higher quality facilities and spend more on non-academic activities. Therefore colleges in the West and Northeast may feel compelled to spend more on student services in order to attract students from the region that on average likely come from a higher income. This is reflected in regression 1.5 where the variables *Northeast* and *West* both have positive coefficients (*Midwest* is omitted due to colinearity.) Colleges in the West and Northeast will spend on average 12.5% and 7.2% more respectively than a college in the Midwest. Furthermore, a college in the South will spend about 8.3% less than a college in the Midwest. Figure 1 is a heat map showing how student services spending per full time enrolled student varies across the US. Areas of red (more spending) are condensed in the Northeast and West, especially along the coast. The Midwest has

smaller, less condensed patches of red throughout the region, as reflected by regression 1.5. The blue dots in Figure 1 are the top 50 universities as reported by U.S. News in 2015.

Unsurprisingly, liberal arts and private schools tend to spend more on student services compared to public schools. Regression 1.5 shows private colleges and liberal arts colleges spend about 45.2% and 26.8% more on student services than public schools on average. Competition could be fiercer between these types of schools which may explain the increased student services spending. Furthermore, private and liberal arts colleges may spend more in these areas as a way to differentiate themselves from public schools of similar academic and instructional quality. These schools generally charge higher tuition therefore prospective students likely have higher standards for the overall facilities and programs that provide for emotional, physical, and social wellbeing outside the framework of traditional student instruction.

Regression 1.3 shows results from a regression including university dummies. The only variables included in the regression are those variables that vary within each university. Those variables are log(*Enrollment)*, and *Year*Miles*. The *log(Enrollment)* variable is positive where a college that increases enrollment by 1% will spend 0.3% more on student services. This displays a possible increasing return relationship for colleges spending more on student services. For example colleges probably understand if enrollment doubles, they do not need to double spending on student services as well. It is worth noting the coefficient on *log(mean enrollment)* is higher in regression 1.5 (0.35) where university dummies are not included, yet the coefficient is still less than one leading to the diminishing returns argument again.

An important difference between regression 1.4 and 1.5 is the addition of a *log(Total Spending)* variable in regression 1.5. The total spending variable essentially controls for colleges that spend a lot of money in general, and as a result spend a lot of money on student services

anyway. The inclusion of the total spending variable in regression 1.5 greatly affects two variables from regression 1.4. The addition of the total spending variable significantly decreases the coefficient on *big bity* (if the college is located in a top 50 CBSA) from 0.14 to 0.02. Furthermore, the addition of *log(Total Spending)* decreases the significance of *big city* in regression 1.5. The big city variable likely acts as a proxy for colleges with high total spending in regression 1.4. Colleges in big cities tend to have much higher total spending than colleges not in big cities. Perhaps due to difference in costs, colleges in big cities tend to have much higher spending than colleges not located in big cities where transportation and good are generally cheaper. Therefore the coefficient on *big city* decreases and becomes less significant between regression 1.4 and 1.5. The top 50 school variable also undergoes a similar shift between regression 1.4 and 1.5. In regression 1.4, *top 50 school* is positive, but when *total spending* is added, it actually becomes negative. Top 50 schools have significantly higher total spending compared to non-top 50 schools and the total spending variable likely acts as a proxy for higher-ranked schools. These high ranked schools are generally well-established institutions with significantly higher endowments, leading to increased total spending. This helps to explain why the top 50 variable switches from positive to negative between regression 1.4 and 1.5.

As indicated SS spending increases a lot over time and Regressions 1.6-1.12 explore this deeper, providing separate regressions for each year used in the data. The behavior of the log(miles) variable between regressions is the most interesting difference between regressions. The variable does not become significant until between the 1995 and 2000 regression. Perhaps this is due to significant increases in competition between colleges around the beginning of the 21st century. There is also a large increase in student services spending as a proportion of total spending between 1995 and 2000, relative to other years. Figure 2 displays this increase for all

schools as well as top 50 schools. This helps explain the sudden significance of student services spending as it relates to the geographic *miles* variable between the years 1995 and 2000.

IV. Tables and Figures

Table 1: Summary Stats, All Schools

Variable	Mean	Standard Deviation
Distance to Closest Top 50 School (miles)	126.2	189.1
Full Time Enrolled (FTE)	6436.9	8026.6
Student Services Spending	$15,122,343	$23,995,650
Total Spending	$332,761,255	$186,630,822
SS Spending / FTE	$3,164	$3,703
Total Spending / FTE	$48,775	$110,032

Table 2: Summary Stats, Top 50 vs Not Top 50

	Top 50		Not Top 50	
Variable	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Distance to Closest Top 50 School	87.5	132.1	131.3	194.8
Full Time Enrolled (FTE)	11337.2	9294.9	5797.1	7618.7
Student Services Spending	$42,557,938	$49,372,148	$11,551,292	$14,951,538
Total Spending	$1,330,429,812	$371,901,964	$202,511,172	$391,282,824
SS Spending / FTE	$4,995	$6,382	$2,926	$3,118
Total Spending / FTE	$178,335	$286,358	$31,861	$23,072

Table 3: Summary Stats, Proportion-Based Statistics

Variable	All Schools	Top 50	Non Top 50
Midwest %	24.2%	16.9%	25.2%
West %	15.0%	16.9%	14.7%
South %	26.9%	25.3%	27.1%
Northeast %	33.9%	41.0%	33.0%
Big %	46.3%	59.9%	44.5%
Liberal Arts %	29.5%	0%	33.3%
Private %	71.7%	70.5%	71.8%

Table 4: Student Services Spending 1985-2015 Regressions

	Dependent Variable: log(Student Services Spending)				
Variable	**Reg 1.1**	**Reg 1.2**	**Reg 1.3**	**Reg 1.4**	**Reg 1.5**
log(Miles)	-0.032*** (0.009)	-0.032*** (0.009)		-0.029** (0.009)	-0.021* (0.008)
log(mFTE)	0.819*** (0.015)	0.819*** (0.015)		0.819*** (0.015)	0.355*** (0.021)
log(FTE)			0.298*** (0.037)		
Miles*Top 50 School				-0.014*** (0.02)	0.028 (0.017)
Miles*Year			-0.002*** (0)	-0.003*** (0.001)	-0.002*** (0.001)
Big City	0.141*** (0.024)	0.141*** (0.024)		0.141*** (0.024)	0.022 (0.021)
Liberal Arts	0.292*** (0.03)	0.293*** (0.03)		0.292*** (0.03)	0.268*** (0.026)
Private	0.496*** (0.031)	0.496*** (0.031)		0.497*** (0.031)	0.452*** (0.027)
Top 50 School	0.615*** (0.032)	0.615*** (0.032)		0.666*** (0.08)	-0.116 (0.075)
log(mSS 10 closest)					0.017 (0.01)
Northeast	0.093** (0.03)	0.093** (0.03)		0.094** (0.03)	0.073** (0.025)
South	-0.08** (0.031)	-0.08** (0.031)		-0.08** (0.03)	-0.085** (0.026)
West	0.159*** (0.035)	0.159*** (0.035)		0.158*** (0.035)	0.125*** (0.03)
log(Total Spending)					0.484*** (0.018)
Year		0.073*** (0.001)			
Year Fixed Effects	X		X	X	X
University Fixed Effects		X			
Intercept	7.509*** (0.156)	-136.493*** (2.117)	8.138*** (0.323)	7.325*** (0.162)	2.644 (0.226)
n	2178	2178	2178	2178	2178
R^2	0.822	0.820	0.962	0.823	0.869

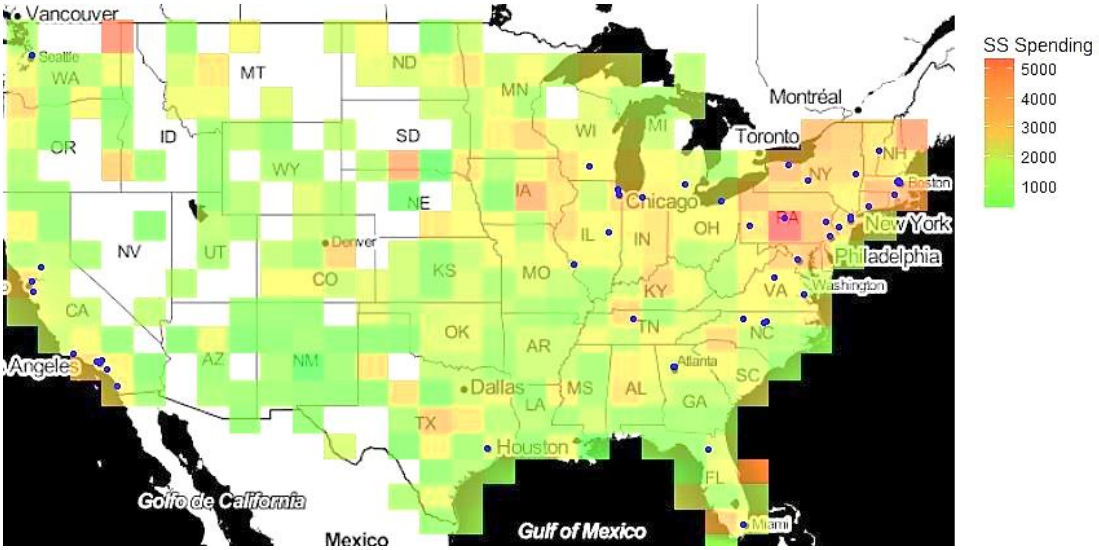
Notes: Standard errors are shown in parenthesis. $^{*}p<0.05$; $^{**}p<0.01$; $^{***}p<0.001$
Miles is the number of miles a colleges is from the nearest top 50 university. *mFTE* is the average full time enrollment over 1985-2015. *SS 10 closest* represents the average student services spending of the ten closest colleges.

Table 5: Student Services Spending Regressions by Year

Dependent Variable: log(Student Services Spending)							
Variable	**Reg 1.6 1985**	**Reg 1.7 1990**	**Reg 1.8 1995**	**Reg 1.9 2000**	**Reg 1.10 2005**	**Reg 1.11 2010**	**Reg 1.12 2015**
Constant	7.014*** (0.479)	8.021*** (0.446)	8.387*** (0.386)	8.801*** (0.4)	9.27*** (0.39)	9.639*** (0.376)	9.564*** (0.345)
log(Miles)	-0.005 (0.026)	-0.035 (0.025)	-0.01 (0.022)	-0.033 (0.022)	-0.042. (0.023)	-0.048* (0.022)	-0.047* (0.02)
log(mFTE)	0.877*** (0.047)	0.835*** (0.044)	0.81*** (0.038)	0.802*** (0.04)	0.782*** (0.039)	0.793*** (0.037)	0.826*** (0.035)
Big City	0.159* (0.072)	0.135 (0.07)	0.164** (0.06)	0.116* (0.058)	0.141* (0.061)	0.135* (0.059)	0.14* (0.055)
Liberal Arts	0.393*** (0.093)	0.364*** (0.088)	0.247** (0.076)	0.345*** (0.075)	0.291*** (0.077)	0.219** (0.073)	0.183** (0.068)
Private	0.331*** (0.096)	0.307*** (0.092)	0.409*** (0.078)	0.591*** (0.079)	0.655*** (0.08)	0.556*** (0.077)	0.607*** (0.071)
Top 50 School	0.568*** (0.095)	0.615*** (0.092)	0.57*** (0.08)	0.578*** (0.08)	0.684*** (0.083)	0.63*** (0.08)	0.659*** (0.075)
Northeast	0.031 (0.09)	0.004 (0.087)	0.009 (0.075)	0.144 (0.074)	0.156* (0.077)	0.147* (0.073)	0.15* (0.069)
South	-0.169 (0.093)	-0.205* (0.088)	-0.175* (0.077)	-0.043 (0.075)	-0.03 (0.08)	0.017 (0.077)	0.052 (0.071)
West	0.236* (0.106)	0.122 (0.105)	0.124 (0.09)	0.108 (0.087)	0.124 (0.091)	0.163. (0.086)	0.231** (0.08)
n	297	300	308	313	312	320	328
R^2	0.7	0.706	0.746	0.702	0.713	0.738	0.773

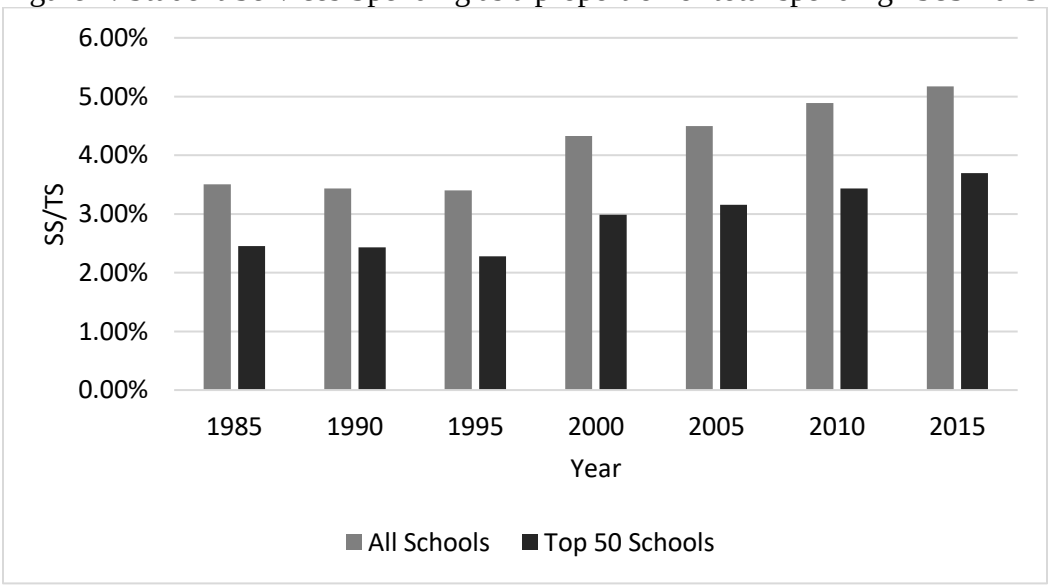
Notes: Standard errors are shown in parenthesis. p. <0.1; *p<0.05; **p<0.01; ***p<0.001

Figure 1: Heat Map of Student Services Spending per Full Time Student



Note: Blue dots represent Top 50 ranked schools by U.S. News in 2015

Figure 2: Student Services Spending as a proportion of total spending 1985-2015



V. Conclusion

With abundant data on postsecondary institutions in the US, mostly provided by IPEDS, predictors of student services spending behavior of colleges are identified. The analysis covers "more selective" institutions, as identified by the Carnegie Classification System, between the years 1985 and 2015. At more selective colleges, student services spending as a proportion of total spending increased by 91% from 1984 to 2015. This helps to explain the proposition that as competition between universities increases over time, schools may spend more on student services in order to attract top students. The OLS regressions also identified some variables that may be predictive of student services spending at universities. Several geographic variables produced notable results. As a college moves closer to a top 50 university, its student services spending increases, suggesting geographically competitive relationships between colleges. Regressions also indicated that a college's region and whether or not it is located in a big city also influences student services spending.

Although the regressions run in this project are relatively expansive, more years and variables could be added to the data. Right now the data is in a panel form taken every five years from 1985 to 2015. In the future, all years could be added between 1985 and 2015. It is also important to note that the regressand – student services spending per full time enrolled – is not a perfect variable and may not fully capture a university's spending on things like new gyms, dining halls and dorms. Further work could be done to potentially identify a better variable that may act as a measureable proxy for the competitive pressures a school faces. Another interesting geographically-based variable that could be added in the future is the average size of a college's ten closest schools. Perhaps colleges with a lot of large schools nearby, that attract more students, need to spend more on student services in order to compete. More detailed

income distribution information on the undergraduate bodies of each college could determine if there is a link between student income and student services spending. Hopefully this analysis of competition between colleges through student services spending behavior reveals the complicated challenges colleges face when deciding how to allocate finances.

VI. Appendix

Table 6: Colleges with The Highest Student Services Spending per Student (2015)

Rank	College	SS Spending / FTE ($)
1	Yale University	47219.49
2	United States Naval Academy	28729.79
3	Franklin W Olin College of Engineering	27566.83
4	Stanford University	26210.15
5	Princeton University	22340.29
6	California Institute of Technology	19868.53
7	Dartmouth College	18266.72
8	Northwestern University	17729.70
9	Vanderbilt University	16756.37
10	Massachusetts Institute of Technology	16749.57
11	Rice University	16647.70
12	University of Chicago	16036.61
13	Columbia University	15826.19
14	United States Merchant Marine Academy	15249.03
15	Pepperdine University	14232.89

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